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UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Kevin J. Youngers

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Application No.: 09/911,912

Examiner: Colin M. LaRose

Filing Date: 07/24/2001

Group Art Unit: 2623

Title: METHOD AND APPARATUS FOR REDUCING INACCURACIES WHEN PROCESSING
COLOR DATA WITH A TONE MAP

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Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on 04/13/2005.

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(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

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() The extension fee has already been filled in this application.

(X) (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS

Appellant:	Kevin J. Youngers	Appeal Brief
Serial No.	09/911,912	
Filing Date	July 24, 2001	
Group Art Unit	2623	
Examiner	Colin M. LaRose	
Attorney Docket No.	200.039US01	
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Introduction

On April 13, 2005, Appellants filed a notice of appeal from the final rejection of claims 1-18 set forth in the Final Office Action mailed February 16, 2005. Three copies of this Appeal Brief are hereby timely and are accompanied by a fee in the amount of \$500.00 as required under 37 C.F.R. §1.17(c).

1. Real Party Interest

The real party in interest in the above-captioned application is the assignee Hewlett-Packard Development Company, L.P.

2. Related Appeals and Interferences

There are no other appeals or interferences known to the Appellants that will have a bearing on the Board's decision in the present appeal.

3. Status of the Claims

Claims 1-19 are pending in this application. Claim 1-18 were finally rejected and are the subject of this appeal. Claim 19 was objected to as being dependent on a rejected base claim.

4. Status of Amendments

No amendment has been filed subsequent to the Office Action mailed February 16, 2005.

5. Summary of claimed subject matter

Pursuant to 37 C.F.R. §41.37(c)(1)(v), Applicant provides the following concise explanation of the subject matter defined in each independent claim with reference to the specification by page and line number and to the drawings by reference number.

Applicant submits that the citations to the specification and drawings are not intended to be exhaustive and that other support for the various claims may also be found throughout the specification and drawings.

A. Claim 1

Claim 1 is directed to a method of processing color image data. The method of claim 1 is described in the specification at page 5, line 1 to page 6, line 11 and at page 8, lines 4-8 and in Figure 3. The method includes examining a color component of a pixel

in the image (302). The method further includes selectively applying a tone map to the color component of the pixel to create an output color component only when the color component is not in a dark area of the image (304, 306), and selectively blending the transition between pixels in the image (304, 308, 310).

B. Claim 5

Claim 5 is directed to a method of processing color image data contained in an array of pixels. The method of claim 5 is described in the specification at page 5, lines 1-8, page 6, line 3 to page 7, line 7 and at page 8, lines 19-25 and in Figure 3. The method includes selecting at least two thresholds and reading a color component of a pixel (302). The method further transforms the color component of the pixel with a tone map when the color component of the pixel is greater than one of the at least two thresholds (306), preserves the color component when the color component of the pixel is less than another of the at least two thresholds (312), and otherwise modifies the color component of the pixel to smooth the transition between color components of adjacent pixels (310).

C. Claim 12

Claim 12 is directed to a scanner. The scanner of claim 12 is described in the specification at page 5, lines 1-8, page 6, line 3 to page 7, line 7 and at page 9, line 17 to page 10, line 2 and in Figure 3. The scanner includes a photo-sensor array for converting an image into an electrical signal. The scanner further includes an A-to-D converter to convert the electrical signal into raw digital data and a tone map for transforming the raw digital data into corrected digital data. The scanner is further configured to output the raw digital data when the raw digital data is below a first pre-selected threshold (312), to output the corrected digital data when the raw digital data is greater than a second pre-selected value (306), and to output digital data that is interpolated between the raw digital data and the corrected digital data when the raw digital data is between the two thresholds (310).

D. Claim 13

Claim 13 is directed to a method of processing data contained in an array of pixels. The method of claim 13 is described in the specification at page 5, lines 1-8, page 6, line 3 to page 7, line 7 and at page 10, lines 4-15 and in Figure 3. The method includes defining a threshold, defining a range around the threshold, the range having a top end and a bottom end, and defining a tone map. The method further includes reading a color component of a pixel (302). The method also includes applying the tone map to the color component when the color component is above the top of the high end (306) and modifying the color component by interpolation when the color component is below the top end of the high range (310) and above the bottom end of the low range, and; otherwise preserving the color component (312).

E. Claim 17

Claim 17 is directed to a camera. The camera of claim 17 is described in the specification at page 5, lines 1-8, page 6, line 3 to page 7, line 7 and at page 11, lines 4-9 and in Figure 3. The camera includes a photo sensor and a lens system that forms an image on the photo sensor. The camera also includes a tone map for mapping image data and a processor that is configured to map image data only when the image data exceeds a predetermined value (306) and that is configured to blend transitions in the image data (310).

F. Claim 18

Claim 18 is directed to a camera. The camera of claim 18 is described in the specification at page 5, lines 1-8, page 6, line 3 to page 7, line 7 and at page 11, lines 11-16 and in Figure 3. The camera includes a lens system that forms an image on a photo sensor. The camera also includes a means for mapping the image data and a processor that is configured to map the image data only when the image data exceeds a predetermined value (306) and that is configured to blend transitions in the image data (310).

Claim 18 includes a limitation that is presumptively a means plus function limitation. Specifically, claim 18 calls for “a means for mapping the image data.” The structure corresponding to the function of “mapping the image data” is a tone map as specified, for example, in the specification at page 4, line 16 to page 5, line 8.

6. Grounds of rejection to be reviewed on appeal

Whether claims 8, 10, and 11 fail to particularly point out and distinctly claim the subject matter that the applicant regards as the invention?

Whether claims 5-9 are anticipated under 35 U.S.C. §102(e) by Farnung (U.S. Patent No. 6,753,987)?

Whether claim 10 and 11 are obvious under 35 U.S.C. §103(a) based on Farnung?

Whether claims 1-4 are obvious under 35 U.S.C. §103(a) based on Sugimoto (U.S. Patent No. 6,215,529) in view of Wu (U.S. Patent No. 5,959,693)?

Whether claims 17 and 18 are obvious under 35 U.S.C. §103(a) based on Hieda (U.S. Patent No. 5,481,317) in view of Sugimoto and Wu?

Whether claim 12 is obvious under 35 U.S.C. §103(a) based on Farnung in view of Kishida (U.S. Patent No. 5,287,418) and Hieda?

Whether claims 13-15 are obvious under 35 U.S.C. §103(a) based on Farnung in view of Kishida?

Whether claim 16 is obvious under 35 U.S.C. §103(a) based on Farnung in view of Kishida and further in view of Ishikawa (U.S. Patent No. 6,636,229)?

7. Argument

A. Objection under 37 C.F.R. §1.75(a)

The Examiner objected to claims 8, 10, and 11 under 37 C.F.R. §1.75(a) as failing to particularly point out and distinctly claim the subject matter that the Applicant regards as the invention. Applicant respectfully traverses the objection.

Claim 8 depends from claim 7 and specifies that “a different threshold is used to create each output color component in the color image.” The Examiner asserts that this

language is indefinite because claim 5 was amended to call for “at least two thresholds.” The Applicant respectfully traverses this assertion.

The at least two thresholds called out in claim 5 are both applied to the same color component. Any image processed according to the method of claim 5 will include multiple color components. Claim 8 specifies that each color component uses a “different threshold.” This is entirely consistent with the language of claim 5 since claim 5 only specifies the relationship between thresholds applied to a single color component and is silent on the processing of the other color components. Reversal of the objection is respectfully requested.

Claims 10 and 11 depend from claim 5 and specify particular threshold values. Applicant respectfully asserts that it is clear that the limitations of claims 10 and 11 apply to one of the at least two thresholds. Therefore, reversal of the objection is respectfully requested.

B. Rejection under 35 U.S.C. §102(e).

i. The Applicable Law

35 U.S.C. § 102 provides in relevant part:

A person shall be entitled to a patent unless-

(e) the invention was described in — (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

A claim is anticipated under 35 U.S.C. § 102(e) only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051,1053 (Fed. Cir. 1987). “The identical invention must be shown in as

complete detail as is contained in the...claim.” *Richardson v. Suzuki Motor Co.* 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but identical terminology is not required. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990).

Anticipation focuses on whether a claim reads on a product or process disclosed in a prior art reference, not on what the reference broadly teaches. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983). To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. v. Guardian Industries Corp.*, 75 F.3d 1558, 37 U.S.P.Q. 2d 1618 (Fed Cir. 1996).

ii. Rejection of claims 5-9 under 35 U.S.C. §102(e)

The Examiner rejected claims 5-9 as being anticipated by under 35 U.S.C. §102(e) by Farnung (U.S. Patent No. 6,753,987). Applicant respectfully traverses the rejection.

Claim 5 calls for “selecting at least two thresholds” and “transforming the color component of the pixel with a tone map when the color component of the pixel is greater than one of the at least two thresholds, preserving the color component when the color component of the pixel is less than another of the at least two thresholds, and otherwise modifying the color component of the pixel to smooth the transition between color components of adjacent pixels.”

The Examiner admits that Farnung does not disclose “otherwise modifying . . . to smooth” the transition between color components of adjacent pixels as called for in claim 5. The Examiner asserts that Farnung anticipates claim 5 because this limitation “is not required to be performed.” Applicant respectfully traverses this assertion.

The Examiner’s interpretation of claim 5 effectively reads this limitation out of the claim. This is not permissible. A reference does not anticipate a claim unless it teaches all of the limitations of the claim; even if the limitation is conditional. As the

Examiner admitted, the limitation is not taught in Farnung, thus, claim 5 is not anticipated by Farnung. Withdrawal of the rejection of claim 5 is respectfully requested.

Claims 6-9 depend from claim 5 and thus are also allowable over the art at least for the reasons identified above. Reversal of the rejection is respectfully requested.

C. Rejections Under 35 U.S.C. § 103(a)

i. The Applicable Law

35 U.S.C. § 103 provides in relevant part:

Conditions for patentability, non-obvious subject matter.

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

“The ultimate determination...whether an invention is or is not obvious is a legal conclusion based on underlying factual inquiries including (1) the scope and content of the prior art; (2) the level of ordinary skill in the prior art; (3) the differences between the claimed invention and the prior art; and (4) the objective evidence of nonobviousness.” In *re Dembiczak*, 175 F.3d 994, 998, 50 USPQ2d 1614, 1616 (1999) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966)).

When applying 35 U.S.C. § 103, the claimed invention must be considered as a whole; the references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention and a reasonable expectation of success is the standard with which obviousness is determined. *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestions or motivation, either in the references themselves or in the knowledge generally available to one of the ordinary skill in the art, to modify

the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP 2143.

The teaching or suggestions to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. MPEP 2143 citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

ii. Rejection of claims 10 and 11 under 35 U.S.C. §103(a)

The Examiner rejected claims 10 and 11 as obvious under 35 U.S.C. §103(a) based on Farnung. Applicant respectfully traverses the rejection.

Claims 10 and 11 depend from claim 5, and, as such include the limitations discussed above with respect to claim 5. Therefore, claims 10 and 11 are also allowable. Reversal of the rejection is respectfully requested.

iii. Rejection of claims 1-4 under 35 U.S.C. §103(a)

The Examiner rejected claims 1-4 as obvious under 35 U.S.C. §103(a) based on Sugimoto (U.S. Patent No. 6,215,529) in view of Wu (U.S. Patent No. 5,959,693). Applicant respectfully traverses the rejection.

Claim 1 is directed to a method of processing color image data. The method includes examining a color component of a pixel in the image. The method further includes selectively applying a tone map to the color component of the pixel to create an output color component only when the color component is not in a dark area of the image, and selectively blending the transition between pixels in the image.

The Examiner admits that Sugimoto does not teach or suggest selectively blending the transition between pixels in an image. The Examiner asserts that this limitation is taught in Wu and that it would have been obvious to combine this element of Wu with Sugimoto. The Examiner further asserts that the combination is obvious because "Wu discloses that it is desirable to reduce the noise in an image, and reducing

noise is . . . accomplished by selectively blending transitions between pixels so that noise is reduced while image sharpness is maintained.” Final Office Action, at p. 6. Applicant respectfully traverses this assertion.

First, even if Wu is combined with Sugimoto, the combination does not produce the claimed invention. As discussed by the Examiner, Wu purports to teach a method to filter noise from a video image without losing sharpness in the image. Applicant respectfully asserts that filtering, as taught in Wu, is not the same as blending, as called for in the claim. Filtering removes noise from an image. Wu uses weaker filtering at edges in an image to maintain the edges; otherwise, the edges would be lost due to over filtering. *See, e.g.*, Col. 8, lines 31-33. Blending is used in the context of the claimed invention to reduce sharp transitions between pixels in a dark area of an image (not tone mapped) and a lighter area (tone mapped). Specification, p. 6, lines 3-11. Thus, the combination of the references does not teach or suggest the claimed invention.

Further, there is no motivation to combine the references. There is nothing in Sugimoto that recognizes a problem that could be solved by blending pixels as claimed. Further, there is nothing in Wu that indicates that selective filtering can be used to blend pixels in a system that selectively applies a tone map to color components not in a dark area of an image.

Reversal of the rejection is respectfully requested.

iv. Rejection of claims 17 and 18 under 35 U.S.C. §103(a)

The Examiner rejected claims 17 and 18 as obvious under 35 U.S.C. §103(a) based on Hieda (U.S. Patent No. 5,481,317) in view of Sugimoto and Wu. Applicant respectfully traverses the rejection.

Claim 17 calls for:

a processor configured to map image data when the image data exceeds a predetermined value and configured to blend transitions in the image data.

There is no motivation to combine the references applied by the Examiner. The Examiner notes that Hieda does not disclose “that the image data is mapped only when it exceeds a predetermined value.” Office Action at p. 7. The Examiner further asserts that

it would have been obvious to modify Hieda with the teaching of Sugimoto to only modify a signal above a threshold because “Sugimoto shows that correcting only input values of a color component signal above a certain threshold achieves a desirable result.” Office Action at p. 8. Applicant respectfully traverses this assertion. First, the assertion provides no substantive reason for changing Hieda. The Examiner does not provide any explanation as to the nature of the desirable result achieved in Sugimoto. The Examiner further does not provide any indication that Hieda is in need of this change. The Examiner appears to be taking the position that it would be obvious to use the approach of Sugimoto in Hieda because Sugimoto used it and it worked for Sugimoto. This smacks of the “obvious to try” test that has been soundly rejected by the courts.

There is also no motivation to combine We with Sugimoto and Hieda as discussed above.

Even if the Board determines that the references can be properly combined, the combined references do not teach or suggest all of the limitations of claims.

Claim 17 calls for:

a processor configured to map image data when the image data exceeds a predetermined value and configured to blend transitions in the image data.

Claim 18 calls for:

a processor configured to map image data when the image data exceeds a predetermined value and configured to blend transitions in the image data.

None of the references, alone or in combination, teach or suggest blending transitions in the image data as called for in claims 17 and 18. As discussed above, Wu does not teach or suggest blending transitions in image data.

Reversal of the rejection is respectfully requested.

v. Rejection of claim 12 under 35 U.S.C. §103(a)

The Examiner rejected claim 12 as obvious under 35 U.S.C. §103(a) based on Farnung in view of Kishida (U.S. Patent No. 5,287,418) and Hieda. Applicant respectfully traverses the rejection.

Claim 12 is directed to a scanner that is configured “to output digital data that is interpolated between the raw digital data and the corrected digital data when the raw digital data is between the two thresholds.” The Examiner acknowledges that Farnung does not teach or suggest “modifying the midrange by interpolation.” The Examiner attempts to fill this gap in the teachings of Farnung with Kishida. The Examiner asserts that one skilled in the art would be motivated to combine Farnung and Kishida because Kishida discloses interpolation in a midrange region of a tone curve that “allows the desired contributions of regional tone curves to be selected for application to the overall tone curve.” Office Action, at p. 9-10.

Applicant respectfully asserts that this rationale fails to provide a basis for combining the references. Farnung already provides a mechanism to adjust the tone map in the region of interest. As admitted by the Examiner, this mechanism is different from the claimed use of interpolation. The Examiner fails to explain why one of skill in the art would be motivated to use the “interpolation” technique of Kishida instead of the different technique described in Farnung. The Examiner fails to identify a problem in Farnung that would be solved by the change or a benefit from Kishida that is missing in Farnung. Therefore the combination is improper.

Reversal of the rejection is respectfully requested.

vi. Rejection of claims 13-15 under 35 U.S.C. §103(a)

The Examiner rejected claims 13-15 as obvious under 35 U.S.C. §103(a) based on Farnung in view of Kishida. Applicant respectfully traverses the rejection.

Claim 13 is directed to a method of processing data contained in an array of pixels. Among other limitations, the method calls for “modifying the color component by interpolation.” The Examiner acknowledges that Farnung does not teach or suggest “modifying the midrange by interpolation.” The Examiner attempts to fill this gap in the

teachings of Farnung with Kishida. The Examiner asserts that one skilled in the art would be motivated to combine Farnung and Kishida because Kishida discloses interpolation in a midrange region of a tone curve that “allows the desired contributions of regional tone curves to be selected for application to the overall tone curve.” Office Action, at p. 11-12.

Applicant respectfully asserts that this rationale fails to provide a basis for combining the references. Farnung already provides a mechanism to adjust the tone map in the region of interest. As admitted by the Examiner, this mechanism is different from the claimed use of interpolation. The Examiner fails to explain why one of skill in the art would be motivated to use the “interpolation” technique of Kishida instead of the different technique described in Farnung. The Examiner fails to identify a problem in Farnung that would be solved by the change or a benefit from Kishida that is missing in Farnung. Therefore the combination is improper. Withdrawal of the rejection is respectfully requested.

Claims 14 and 15 depend from claim 13, and, as such is also patentable at least for the reasons identified above.

Reversal of the rejection is respectfully requested.

vii. Rejection of claim 16 under 35 U.S.C. §103(a)

The Examiner rejected claim 16 as obvious under 35 U.S.C. §103(a) based on Farnung in view of Kishida and further in view of Ishikawa (U.S. Patent No. 6,636,229). Applicant respectfully traverses this rejection.

Claim 16 depends from claim 14 and is allowable at least for the reasons identified above with respect to claim 14.

APPEAL BRIEF


Serial No. 09/911,912

Attorney Docket No. 200.039US01

Title: METHOD AND APPARATUS FOR REDUCING INACCURACIES WHEN PROCESSING COLOR DATA
WITH A TONE MAP

Respectfully submitted,

Date: June 10, 2005



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CLAIMS APPENDIX

1. A method of processing color image data, comprising:
 - (a) examining a color component of a pixel in the image;
 - (b) selectively applying a tone map to the color component of the pixel to create an output color component only when the color component is not in a dark area of the image; and
 - (c) selectively blending the transition between pixels in the image.
2. The method of claim 1, further comprising:
repeating steps (a) and (b) for essentially each pixel in the image.
3. The method of claim 1, further comprising:
blending the transition between pixels in the image that are in a dark area and pixels in the image that are not in a dark area.
4. The method of claim 1 where the tone map is using a gamma correction curve.
5. A method of processing color image data contained in an array of pixels, comprising:
 - selecting at least two thresholds;
 - (a) reading a color component of a pixel;
 - (b) transforming the color component of the pixel with a tone map when the color component of the pixel is greater than one of the at least two thresholds, preserving the color component when the color component of the pixel is less than another of the at least two thresholds, and otherwise modifying the color component of the pixel to smooth the transition between color components of adjacent pixels.
6. The method of claim 5, further comprising:

repeating steps (a) and (b) for essentially each pixel in the array.

7. The method of claim 6 where steps (a) through (b) are repeated to create a new output color component for each of the color components in the color image.
8. The method of claim 7 where a different threshold is used to create each output color component in the color image.
9. The method of claim 7 where there are different tone maps for creating each output color component in the color image.
10. The method of claim 5 where the threshold is approximately 20 eight bit counts.
11. The method of claim 5 where the threshold is approximately 10 eight bit counts.
12. A scanner, comprising:
 - a photo-sensor array for converting an image into an electrical signal;
 - an A-to-D converter to convert the electrical signal into raw digital data;
 - a tone map for transforming the raw digital data into corrected digital data;
 - the scanner configured to output the raw digital data when the raw digital data is below a first pre-selected threshold, to output the corrected digital data when the raw digital data is greater than a second pre-selected value, and to output digital data that is interpolated between the raw digital data and the corrected digital data when the raw digital data is between the two thresholds.
13. A method of processing data contained in an array of pixels, comprising:
 - defining a threshold;
 - defining a range around the threshold, the range having a top end and a bottom end;

defining a tone map;

(a) reading a color component of a pixel;

(b) applying the tone map to the color component when the color component is above the top of the high end;

(c) modifying the color component by interpolation when the color component is below the top end of the high range and above the bottom end of the low range, and; otherwise preserving the color component.

14. The method of claim 13 further comprising:
repeating steps (a) through (c) for each pixel in the array.
15. The method of claim 13 where steps (a) through (c) are repeated to create a new output color component for each of the color components in the color image.
16. The method of claim 14 where a different threshold is used to create each output color component in the color image.
17. A camera, comprising:
a photo sensor;
a lens system that forms an image on the photo sensor;
a tone map for mapping image data; and
a processor configured to map image data only when the image data exceeds a predetermined value and configured to blend transitions in the image data.
18. A camera, comprising:
a lens system that forms an image on a photo sensor;
a means for mapping the image data; and
a processor configured to map the image data only when the image data exceeds a predetermined value and configured to blend transitions in the image data.